

IN THE CLAIMS

1. (Currently amended) A computer system comprising a computer, a plurality of storage units each containing one or more volumes for storing data used by the computer, and a management computer for managing the status of the plurality of storage units, comprising:

one or more first-level storage units each containing one or more volumes for storing data used by the computer,

one or more second-level storage units, each of which is connected through a communication path to, and hierarchically linked to, one of the first-level storage units and contains one or more volumes for storing data used by the computer, wherein as hierarchically linked, said one or more second-level storage units have a volume that is available for use as a volume in one of said one or more first-level storage units,

volume information collecting means for collecting information on the volumes contained in the first-level and the second-level storage units,

hierarchical information collecting means for collecting information on the hierarchical relationships between volumes contained in the first-level storage units and volumes contained in the second-level storage units, said information on the hierarchical relationships identifying which volumes of

said second-level storage units and said first-level storage units are hierarchically linked together, and

effective capacity calculating means for calculating the total effective capacity of the volumes of the first-level and second-level storage units based on the volume information and the hierarchy hierarchical information thus collected.

2. (Currently amended) The computer system of claim 1, wherein the first-level storage units and the second-level storage units each ~~contains~~ contain one or more virtual storage areas as volumes, and the management computer comprises the volume information collecting means, the hierarchy hierarchical information collecting means, and the effective capacity calculating means.

3. (Currently amended) The computer system of claim 1, wherein each of the first-level storage units comprises means for storing the information on the hierarchical relationships between volumes contained ~~in it~~ therein and volumes contained in the second-level storage units.

4. (Currently amended) The computer system of claim 1, wherein the information collected by the volume information

collecting means includes at least [[the]] an identifier and [[the]] information on the capacity of each volume contained in the first-level and the second-level storage units, each said identifier being formatted according to an identifier format provided by said management computer.

5. (Currently amended) The computer system of claim 1, wherein the information collected by the ~~hierarchy~~ hierarchical information collecting means includes [[the]] information indicating the relationship between [[the]] an identifier of each volume contained in the first-level storage units and [[the]] an identifier of its ~~corresponding~~ hierarchically-linked volume contained in the second-level storage unit.

6. (Original) The computer system of claim 1, wherein the management computer comprises a display for displaying the information collected by the volume information collecting means and the result of the calculation made by the effective capacity calculating means.

7. (Currently amended) The computer system of claim 1, wherein the management computer comprises a display that has a

first display section for displaying the volume information of the volumes contained in the second-level storage units that are ~~used by~~ hierarchically linked to volumes contained in the first-level storage units, and a second display section for displaying the volume information of other volumes.

8. (Currently amended) The computer system of claim 1, further comprising an identifier management computer for managing the formats of [[the]] identifiers of the volumes ~~used in it of the first-level and second-level storage units,~~ wherein each of the first-level and the second-level storage units comprises means for inquiring the identifier format of the identifier management computer and means for composing the volume information and the hierarchy hierarchical information in accordance with the identifier format held in the identifier management computer.

9. (Currently amended) A management computer for managing the status of storage units containing volumes for storing data used by a computer, ~~executes comprising:~~ volume information collecting program means for collecting information on the volumes from one or more first-level storage units containing volumes for storing data used

by the computer, and from one or more second-level storage units, each of which is connected through a communication path to, and hierarchically linked to, one of the first-level storage units and contains at least one volume for storing data used by the computer, wherein as hierarchically linked, said one or more second-level storage units have a volume that is available for use as a volume in one of said one or more first-level storage units,;

hierarchy hierarchical information collecting program means for collecting information on the hierarchical relationships between volumes in the first-level storage units and volumes in the second-level storage units, said information on the hierarchical relationships identifying which volumes of said second-level storage units and first-level storage units are hierarchically linked together,; and

effective capacity calculating program means for calculating the total effective capacity of the volumes of the first-level and second-level storage units based on the volume information and the hierarchy hierarchical information thus collected.

10. (Currently amended) The management computer of claim 9, further comprising a display for displaying the

information collected by the volume information collecting program means and the result of the calculation made by the effective capacity calculating program means.

11. (Currently amended) The management computer of claim 9, further comprising a display for displaying information on the volumes in the first-level storages that are made available to the computer and an input device for inputting information on volumes, wherein information on volumes is displayed on the display as objects, and

when a specific object on the display is selected by the input device, the corresponding volume in the second-level storage unit located through the hierarchy hierarchical information will be identified, and the corresponding volume information obtained by the volume information collecting means from the corresponding volume will be displayed on the display.

12. (Currently amended) The management computer of claim 9, further comprising a display equipped with a screen having a first display section for displaying information on the volumes contained in second-level storage units that are

hierarchically linked to volumes contained in ~~used by~~ the first-level storage units, and a second display section for displaying information on other volumes.

13. (Currently amended) The management computer of claim 9, further comprising a display for displaying as objects volume information of the volumes in the first-level storage units collected by the volume information collecting means, wherein

a first object indicating that the volume in a first-level storage unit is actually provided by a volume in a second-level storage unit hierarchically linked thereto, and a second object representing the volume in the second-level storage unit that is actually provided as the volume in the first-level storage unit hierarchically linked thereto, are displayed on the display in such a way as to reflect the hierarchical relationship between them.

14. (Currently amended) The management computer of claim 10, wherein on the display either a screen where information on volumes in the second-level storage units that are ~~used by~~ hierarchically linked to volumes in the first-level storage units is hidden or a screen showing information

on volumes in the second-level storage units that are not ~~used~~
~~by hierarchically linked to volumes in~~ the first-level storage
units is selectively displayed.

15. (Currently amended) A management method for
managing, using a management computer, capacities of volumes
storing data used by a computer, comprising the steps of:

providing a volume in a first storage unit for storing
data used by the computer,

establishing a hierarchical relationship between the
first storage unit and a second storage unit that allows a
~~volume to be shared between the two in said second storage~~
unit to be made available for use as a volume in said first
storage unit,

collecting from the first storage unit information on the
volumes contained ~~in it therein~~,

collecting from the second storage unit information on
the volumes contained ~~in it therein~~,

collecting information on the hierarchical relationships
between the volumes contained in the first storage unit and
the volumes contained in the second storage unit, said
information on the hierarchical relationships identifying

which volumes of said second storage unit and said first storage unit are hierarchically linked together, and calculating the total effective capacity of the volumes of the first and second storage units to the computer based on the information on the volumes and the information on the hierarchical relationships.

16. (Original) The management method of claim 15, further comprising a step of displaying on a display the collected information on the volumes and the calculated total effective capacity.

17. (Canceled).

18. (Currently amended) A storage medium on which the program of claim 17 is stored a program designed to run on a management computer for managing the storage capacities of storage units containing volumes for storing data used by a computer, the program when executed causing the management computer to perform a method comprising the steps of:

collecting from a first storage unit information on the volumes contained therein for storing data used by the computer,

collecting from a second storage unit, having a hierarchical relationship with the first storage unit, information on the volumes contained therein,

collecting information on the hierarchical relationships between the volumes contained in the first storage unit and the volumes contained in the second storage unit, said information on the hierarchical relationships identifying which volumes of said second storage unit and said first storage unit are hierarchically linked together, wherein as hierarchically linked, said second storage unit has a volume that is available for use as a volume in said first storage unit, and

calculating the total effective capacity of the volumes of the first and second storage units based on the information on the volumes and the information on the hierarchical relationships thus collected.

19. (Currently amended) The storage management system of claim 1, further comprising an identifier management computer connected through the communication path to the first-level storage units, the second-level storage units, and the management computer, wherein the identifier management computer stores in a memory located in it therein, and

manages, identifiers for identifying volumes of the first-level and the second-level storage units in a standardized format, and upon receiving a request for identifier format information from one of the first-level or the second-level storage units or the management computer, retrieves the requested identifier format information from the memory, and sends the requested identifier format information to the first-level storage unit, [[or]] the second-level storage unit, or the management computer requesting it.

20. (Currently amended) The management method of claim 15, further comprising

a step of registering in a memory, and managing, identifier format information for identifying volumes of the first-level storage units and the second-level storage units in a standardized format, wherein

the management computer, when started up, retrieves the identifier format information from the memory, and, when collecting from the first-level and the second-level storage units information on the volumes contained ~~in them~~ therein, and when collecting information on the hierarchical relationships ~~between them~~ therebetween, obtains the

information thus collected based on the identifier format information.

21. (Currently amended) The management method of claim 20, wherein the identifier format information that is registered and managed includes at least the vendor name, the model name, and the volume number of the volume of the first-level or the second-level storage unit, as the case may be.

22. (Currently amended) The management method of claim 16, wherein the screen of the display has a display section for displaying the identifier, capacity, and associated icon of each upper level volume of the first storage unit, and a display section for displaying the identifier, capacity, and associated icon of each lower level volume of the second storage unit, and a display section for displaying the total available capacity.

23. (Currently amended) In a computer system including one or more first-level storage units each containing one or more volumes for storing data used by a computer, one or more second-level storage units each of which is connected through a communication path to, and hierarchically linked to, one of

the first-level storage units and contains one or more volumes for storing data used by the computer, and a management computer for managing the status of the volumes contained in the first-level and the second-level storage units, wherein as hierarchically linked, said one or more second-level storage units have a volume that is available for use as a volume in one of said one or more first-level storage units, a management method for managing the volumes contained in the first-level and the second-level storage units comprising:

providing volumes in the first-level storage units for storing data used by the computer,

establishing a hierarchical relationship between one of the first-level storage units and one of the second-level storage units that allows a volume ~~to be shared between the two in said one of the second-level storage units to be made~~ available for use as a volume in said one of the first storage units,

storing in a memory, located in each of the first-level and the second-level storage units, identifier format information in a standardized format for identifying volumes of the first-level and the second-level storage units, respectively,

issuing a request for volume information from the management computer to the first-level and the second-level storage units,

consulting the identifier format information stored in the memory in each of the first-level and the storage-level storage units upon receiving the request for volume information, and sending to the management computer the volume information including the number of volumes contained in it, their identifiers and their capacities in the format specified in the identifier format information,

issuing a request for inter-volume hierarchy hierarchical information from the management computer to the first-level and the second-level storage units, said hierarchical information identifying which volumes of said second-level storage units and said first-level storage units are hierarchically linked together,

consulting the identifier format information stored in the memory in each of the first-level and the storage-level storage units, upon receiving the request for inter-volume hierarchy hierarchical information, and sending to the management computer the inter-volume hierarchy hierarchical information contained in it therein in the format specified in the identifier format information,

composing, based on the volume information and the inter-volume hierarchy hierarchical information thus collected, a consolidated information table including an upper-volume column containing the identifier, capacity, icon number, a flag indicating the existence of subordinate volumes for each volume belonging to the higher level of hierarchy, and a lower-volume column containing the identifier, capacity, and icon number for each volume belonging to the lower level of hierarchy in the management computer,

registering the consolidated information table in a memory, and

displaying the contents of the consolidated information table retrieved from the memory in at least three display sections of the display: a display section for displaying the identifiers, capacities, and associated icons, ~~among other things~~, of the volumes belonging to the higher level of hierarchy, a display section for displaying the identifiers, capacities, and associated icons, ~~among other things~~, of the volumes belonging to the lower level of hierarchy, and a display section for displaying the total available capacity ~~among other things~~.

24. (Currently amended) A management computer for managing the status of storage units containing volumes for storing data used by a computer, comprising:

a CPU and a network interface unit connected by a management network,

wherein the CPU collects information on the volumes from one or more first-level storage units containing volumes for storing data used by the computer and from one or more second-level storage units each of which is connected through a communication path to, and hierarchically linked to, one of the first-level storage units and contains at least one volume for storing data used by the computer, and information on the hierarchical relationships between volumes in the first-level storage units and volumes in the second-level storage units via said network interface, wherein as hierarchically linked, said one or more second-level storage units have a volume that is available for use as a volume in one of said one or more first-level storage units, and wherein said information on the hierarchical relationships identifies which volumes of said second-level storage units and said first-level storage units are hierarchically linked together; and calculates the total effective capacity of the volumes of the first-level and

second-level storage units based on the volume information and the hierarchy information thus collected.

25. (Original) The management computer of claim 24, further comprising a display for displaying the information collected and the result of the calculation by said CPU.